

SEQUENCE LISTING¹

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<120> Packaging of Immunostimulatory Substances into Virus-like
Particles: Method of Preparation and Use

<130> PA060WO

<160> 111

<170> PatentIn version 3.2

<210> 1
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<212> DNA
<213> Artificial sequence

<220>
<223> oligonucleotide ISS

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gacgatcgtc 10

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<213> Artificial sequence

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<223> oligonucleotide G3-6

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<223> oligonucleotide G4-6

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gggggacgat cgtcgggggg 20

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ggggggacga tcgtcggggg g 21

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22

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 ggggggggac gatcgtcggg gggg

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 <223> oligonucleotide G8-8

<400> 7
 ggggggggga cgatcgtcgg gggggg

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 gggggggggg acgatcgtcg gggggggg

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 <223> oligonucleotide G6

<400> 9
 ggggggac gacgatcgtc gtcggggggg

30

<210> 10
 <211> 132
 <212> PRT
 <213> Bacteriophage Q-beta

<400> 10

Ala Lys Leu Glu Thr Val Thr Leu Gly Asn Ile Gly Lys Asp Gly Lys
 1 5 10 15

Gln Thr Leu Val Leu Asn Pro Arg Gly Val Asn Pro Thr Asn Gly Val
 20 25 30

Ala Ser Leu Ser Gln Ala Gly Ala Val Pro Ala Leu Glu Lys Arg Val
 35 40 45

Thr Val Ser Val Ser Gln Pro Ser Arg Asn Arg Lys Asn Tyr Lys Val
 50 55 60

Gln Val Lys Ile Gln Asn Pro Thr Ala Cys Thr Ala Asn Gly Ser Cys
 65 70 75 80

Asp Pro Ser Val Thr Arg Gln Ala Tyr Ala Asp Val Thr Phe Ser Phe
85 90 95

Thr Gln Tyr Ser Thr Asp Glu Glu Arg Ala Phe Val Arg Thr Glu Leu
100 105 110

Ala Ala Leu Leu Ala Ser Pro Leu Leu Ile Asp Ala Ile Asp Gln Leu
115 120 125

Asn Pro Ala Tyr
130

<210> 11
<211> 328
<212> PRT
<213> Bacteriophage Q-beta

<400> 11

Met Ala Lys Leu Glu Thr Val Thr Leu Gly Asn Ile Gly Lys Asp Gly
1 5 10 15

Lys Gln Thr Leu Val Leu Asn Pro Arg Gly Val Asn Pro Thr Asn Gly
20 25 30

Val Ala Ser Leu Ser Gln Ala Gly Ala Val Pro Ala Leu Glu Lys Arg
35 40 45

Val Thr Val Ser Val Ser Gln Pro Ser Arg Asn Arg Lys Asn Tyr Lys
50 55 60

Val Gln Val Lys Ile Gln Asn Pro Thr Ala Cys Thr Ala Asn Gly Ser
65 70 75 80

Cys Asp Pro Ser Val Thr Arg Gln Ala Tyr Ala Asp Val Thr Phe Ser
85 90 95

Phe Thr Gln Tyr Ser Thr Asp Glu Glu Arg Ala Phe Val Arg Thr Glu
100 105 110

Leu Ala Ala Leu Leu Ala Ser Pro Leu Leu Ile Asp Ala Ile Asp Gln
115 120 125

Leu Asn Pro Ala Tyr Trp Leu Leu Ile Ala Gly Gly Gly Ser Gly Ser
130 135 140

Lys Pro Asp Pro Val Ile Pro Asp Pro Pro Ile Asp Pro Pro Pro Gly
145 150 155 160

Thr Gly Lys Tyr Thr Cys Pro Phe Ala Ile Trp Ser Leu Glu Glu Val
165 170 175

Tyr Glu Pro Pro Thr Lys Asn Arg Pro Trp Pro Ile Tyr Asn Ala Val
180 185 190

Glu Leu Gln Pro Arg Glu Phe Asp Val Ala Leu Lys Asp Leu Leu Gly
195 200 205

4

Asn Thr Lys Trp Arg Asp Trp Asp Ser Arg Leu Ser Tyr Thr Thr Phe
 210 215 220

Arg Gly Cys Arg Gly Asn Gly Tyr Ile Asp Leu Asp Ala Thr Tyr Leu
 225 230 235 240

Ala Thr Asp Gln Ala Met Arg Asp Gln Lys Tyr Asp Ile Arg Glu Gly
 245 250 255

Lys Lys Pro Gly Ala Phe Gly Asn Ile Glu Arg Phe Ile Tyr Leu Lys
 260 265 270

Ser Ile Asn Ala Tyr Cys Ser Leu Ser Asp Ile Ala Ala Tyr His Ala
 275 280 285

Asp Gly Val Ile Val Gly Phe Trp Arg Asp Pro Ser Ser Gly Gly Ala
 290 295 300

Ile Pro Phe Asp Phe Thr Lys Phe Asp Lys Thr Lys Cys Pro Ile Gln
 305 310 315 320

Ala Val Ile Val Val Pro Arg Ala
 325

<210> 12
 <211> 362
 <212> PRT
 <213> BK virus

<400> 12

Met Ala Pro Thr Lys Arg Lys Gly Glu Cys Pro Gly Ala Ala Pro Lys
 1 5 10 15

Lys Pro Lys Glu Pro Val Gln Val Pro Lys Leu Leu Ile Lys Gly Gly
 20 25 30

Val Glu Val Leu Glu Val Lys Thr Gly Val Asp Ala Ile Thr Glu Val
 35 40 45

Glu Cys Phe Leu Asn Pro Glu Met Gly Asp Pro Asp Asp Asn Leu Arg
 50 55 60

Gly Tyr Ser Gln His Leu Ser Ala Glu Asn Ala Phe Glu Ser Asp Ser
 65 70 75 80

Pro Asp Arg Lys Met Leu Pro Cys Tyr Ser Thr Ala Arg Ile Pro Leu
 85 90 95

Pro Asn Leu Asn Glu Asp Leu Thr Cys Gly Asn Leu Leu Met Trp Glu
 100 105 110

Ala Val Thr Val Lys Thr Glu Val Ile Gly Ile Thr Ser Met Leu Asn
 115 120 125

Leu His Ala Gly Ser Gln Lys Val His Glu Asn Gly Gly Gly Lys Pro
 130 135 140

Val¹⁴⁵ Gln Gly Ser Asn¹⁵⁰ Phe¹⁵⁵ His Phe Phe Ala¹⁵⁵ Val⁵ Gly Gly Asp Pro Leu¹⁶⁰
 Glu Met Gln Gly Val¹⁶⁵ Leu Met Asn Tyr Arg¹⁷⁰ Thr Lys Tyr Pro Gln Gly¹⁷⁵
 Thr Ile Thr Pro¹⁸⁰ Lys Asn Pro Thr Ala¹⁸⁵ Gln Ser Gln Val¹⁹⁰ Met Asn Thr
 Asp His Lys¹⁹⁵ Ala Tyr Leu Asp Lys²⁰⁰ Asn Asn Ala Tyr Pro²⁰⁵ Val Glu Cys
 Trp Ile²¹⁰ Pro Asp Pro Ser Arg²¹⁵ Asn Glu Asn Thr Arg²²⁰ Tyr Phe Gly Thr
 Tyr Thr Gly Gly Glu Asn²³⁰ Val Pro Pro Val²³⁵ Leu His Val Thr Asn Thr²⁴⁰
 Ala Thr Thr Val²⁴⁵ Leu Leu Asp Glu Gln Gly²⁵⁰ Val Gly Pro Leu Cys²⁵⁵ Lys
 Ala Asp Ser Leu²⁶⁰ Tyr Val Ser Ala Ala²⁶⁵ Asp Ile Cys Gly Leu²⁷⁰ Phe Thr
 Asn Ser Ser²⁷⁵ Gly Thr Gln Gln Trp²⁸⁰ Arg Gly Leu Ala Arg²⁸⁵ Tyr Phe Lys
 Ile Arg²⁹⁰ Leu Arg Lys Arg Ser²⁹⁵ Val Lys Asn Pro Tyr³⁰⁰ Pro Ile Ser Phe
 Leu³⁰⁵ Leu Ser Asp Leu Ile³¹⁰ Asn Arg Arg Thr Gln³¹⁵ Lys Val Asp Gly Gln³²⁰
 Pro Met Tyr Gly Met³²⁵ Glu Ser Gln Val Glu³³⁰ Glu Val Arg Val Phe³³⁵ Asp
 Gly Thr Glu Gln³⁴⁰ Leu Pro Gly Asp Pro³⁴⁵ Asp Met Ile Arg Tyr³⁵⁰ Ile Asp
 Arg Gln Gly³⁵⁵ Gln Leu Gln Thr Lys³⁶⁰ Met Val

<210> 13
 <211> 130
 <212> PRT
 <213> Bacteriophage fr

<400> 13

Met Ala Ser Asn⁵ Phe Glu Glu Phe Val¹⁰ Leu Val Asp Asn Gly¹⁵ Gly Thr
 Gly Asp Val Lys²⁰ Val Ala Pro Ser Asn²⁵ Phe Ala Asn Gly Val³⁰ Ala Glu
 Trp Ile Ser³⁵ Ser Asn Ser Arg Ser⁴⁰ Gln Ala Tyr Lys Val⁴⁵ Thr Cys Ser
 Val Arg Gln Ser Ser Ala Asn Asn Arg Lys Tyr Thr Val Lys Val Glu

50 55 6 60
 Val Pro Lys Val Ala Thr Gln Val Gln Gly Gly Val Glu Leu Pro Val
 65 70 75 80
 Ala Ala Trp Arg Ser Tyr Met Asn Met Glu Leu Thr Ile Pro Val Phe
 85 90 95
 Ala Thr Asn Asp Asp Cys Ala Leu Ile Val Lys Ala Leu Gln Gly Thr
 100 105 110
 Phe Lys Thr Gly Asn Pro Ile Ala Thr Ala Ile Ala Ala Asn Ser Gly
 115 120 125
 Ile Tyr
 130

<210> 14
 <211> 130
 <212> PRT
 <213> Bacteriophage GA

<400> 14

Met Ala Thr Leu Arg Ser Phe Val Leu Val Asp Asn Gly Gly Thr Gly
 1 5 10 15
 Asn Val Thr Val Val Pro Val Ser Asn Ala Asn Gly Val Ala Glu Trp
 20 25 30
 Leu Ser Asn Asn Ser Arg Ser Gln Ala Tyr Arg Val Thr Ala Ser Tyr
 35 40 45
 Arg Ala Ser Gly Ala Asp Lys Arg Lys Tyr Ala Ile Lys Leu Glu Val
 50 55 60
 Pro Lys Ile Val Thr Gln Val Val Asn Gly Val Glu Leu Pro Gly Ser
 65 70 75 80
 Ala Trp Lys Ala Tyr Ala Ser Ile Asp Leu Thr Ile Pro Ile Phe Ala
 85 90 95
 Ala Thr Asp Asp Val Thr Val Ile Ser Lys Ser Leu Ala Gly Leu Phe
 100 105 110
 Lys Val Gly Asn Pro Ile Ala Glu Ala Ile Ser Ser Gln Ser Gly Phe
 115 120 125
 Tyr Ala
 130

<210> 15
 <211> 594
 <212> DNA
 <213> Artificial Sequence

<220>
 <223> HBCAg containing p33 from LCMV

<220>

7

<221> CDS
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<400> 15

atg gac att gac cct tat aaa gaa ttt gga gct act gtg gag tta ctc 48
 Met Asp Ile Asp Pro Tyr Lys Glu Phe Gly Ala Thr Val Glu Leu Leu
 1 5 10 15

tcg ttt ttg cct tct gac ttc ttt cct tcc gtc aga gat ctc cta gac 96
 Ser Phe Leu Pro Ser Asp Phe Phe Pro Ser Val Arg Asp Leu Leu Asp
 20 25 30

acc gcc tca gct ctg tat cga gaa gcc tta gag tct cct gag cat tgc 144
 Thr Ala Ser Ala Leu Tyr Arg Glu Ala Leu Glu Ser Pro Glu His Cys
 35 40 45

tca cct cac cat act gca ctc agg caa gcc att ctc tgc tgg ggg gaa 192
 Ser Pro His His Thr Ala Leu Arg Gln Ala Ile Leu Cys Trp Gly Glu
 50 55 60

ttg atg act cta gct acc tgg gtg ggt aat aat ttg gaa gat cca gca 240
 Leu Met Thr Leu Ala Thr Trp Val Gly Asn Asn Leu Glu Asp Pro Ala
 65 70 75 80

tcc agg gat cta gta gtc aat tat gtt aat act aac atg ggt tta aag 288
 Ser Arg Asp Leu Val Val Asn Tyr Val Asn Thr Asn Met Gly Leu Lys
 85 90 95

atc agg caa cta ttg tgg ttt cat ata tct tgc ctt act ttt gga aga 336
 Ile Arg Gln Leu Leu Trp Phe His Ile Ser Cys Leu Thr Phe Gly Arg
 100 105 110

gag act gta ctt gaa tat ttg gtc tct ttc gga gtg tgg att cgc act 384
 Glu Thr Val Leu Glu Tyr Leu Val Ser Phe Gly Val Trp Ile Arg Thr
 115 120 125

cct cca gcc tat aga cca cca aat gcc cct atc tta tca aca ctt ccg 432
 Pro Pro Ala Tyr Arg Pro Pro Asn Ala Pro Ile Leu Ser Thr Leu Pro
 130 135 140

gaa act act gtt gtt aga cga cgg gac cga ggc agg tcc cct aga aga 480
 Glu Thr Thr Val Val Arg Arg Arg Asp Arg Gly Arg Ser Pro Arg Arg
 145 150 155 160

aga act ccc tcg cct cgc aga cgc aga tct caa tcg ccg cgt cgc aga 528
 Arg Thr Pro Ser Pro Arg Arg Arg Arg Ser Gln Ser Pro Arg Arg Arg
 165 170 175

aga tct caa tct cgg gaa tct caa tgt ctt ctc ctt aaa gct gtt tac 576
 Arg Ser Gln Ser Arg Glu Ser Gln Cys Leu Leu Leu Lys Ala Val Tyr
 180 185 190

aac ttc gct acc atg taa 594
 Asn Phe Ala Thr Met
 195

<210> 16
 <211> 197
 <212> PRT
 <213> Artificial Sequence

<220>
 <223> HBcAg containing p33 from LCMV

<400> 16

Met Asp Ile Asp Pro Tyr Lys Glu Phe Gly Ala Thr Val Glu Leu Leu
 1 5 10 15

Ser Phe Leu Pro Ser Asp Phe Phe Pro Ser Val Arg Asp Leu Leu Asp
 20 25 30

Thr Ala Ser Ala Leu Tyr Arg Glu Ala Leu Glu Ser Pro Glu His Cys

35 40 8 45
 Ser Pro His His Thr Ala Leu Arg Gln Ala Ile Leu Cys Trp Gly Glu
 50 55 60
 Leu Met Thr Leu Ala Thr Trp Val Gly Asn Asn Leu Glu Asp Pro Ala
 65 70 75 80
 Ser Arg Asp Leu Val Val Asn Tyr Val Asn Thr Asn Met Gly Leu Lys
 85 90 95
 Ile Arg Gln Leu Leu Trp Phe His Ile Ser Cys Leu Thr Phe Gly Arg
 100 105 110
 Glu Thr Val Leu Glu Tyr Leu Val Ser Phe Gly Val Trp Ile Arg Thr
 115 120 125
 Pro Pro Ala Tyr Arg Pro Pro Asn Ala Pro Ile Leu Ser Thr Leu Pro
 130 135 140
 Glu Thr Thr Val Val Arg Arg Arg Asp Arg Gly Arg Ser Pro Arg Arg
 145 150 155 160
 Arg Thr Pro Ser Pro Arg Arg Arg Arg Ser Gln Ser Pro Arg Arg Arg
 165 170 175
 Arg Ser Gln Ser Arg Glu Ser Gln Cys Leu Leu Leu Lys Ala Val Tyr
 180 185 190
 Asn Phe Ala Thr Met
 195

<210> 17
 <211> 246
 <212> DNA
 <213> Artificial Sequence

<220>
 <223> dsDNA fragment for packaging and stabilization of BKV

<400> 17
 ggcggtggtg tcagatctac aatgatcgtc atcaccttgg tgatgctgaa gaagaaacag 60
 tacacatcca ttcatcatgg tgtggtggag gttgacgccg ctgtcacccc agaggagcgc 120
 cacctgtcca agatgcagca gaacggctac gaaaatccaa cctacaagtt ctttgagcag 180
 atgcagaacg ctacgtatcc atacgatgtc cctgattacg cctaacgcga attcgccagc 240
 acagtg 246

<210> 18
 <211> 5
 <212> PRT
 <213> Artificial Sequence

<220>
 <223> GGKGG Linker

<400> 18

Gly Gly Lys Gly Gly
 1 5

<210> 19
 <211> 128
 <212> PRT
 <213> Bacteriophage PP7

<400> 19

Met Ser Lys Thr Ile Val Leu Ser Val Gly Glu Ala Thr Arg Thr Leu
 1 5 10 15

Thr Glu Ile Gln Ser Thr Ala Asp Arg Gln Ile Phe Glu Glu Lys Val
 20 25 30

Gly Pro Leu Val Gly Arg Leu Arg Leu Thr Ala Ser Leu Arg Gln Asn
 35 40 45

Gly Ala Lys Thr Ala Tyr Arg Val Asn Leu Lys Leu Asp Gln Ala Asp
 50 55 60

Val Val Asp Cys Ser Thr Ser Val Cys Gly Glu Leu Pro Lys Val Arg
 65 70 75 80

Tyr Thr Gln Val Trp Ser His Asp Val Thr Ile Val Ala Asn Ser Thr
 85 90 95

Glu Ala Ser Arg Lys Ser Leu Tyr Asp Leu Thr Lys Ser Leu Val Ala
 100 105 110

Thr Ser Gln Val Glu Asp Leu Val Val Asn Leu Val Pro Leu Gly Arg
 115 120 125

<210> 20
 <211> 132
 <212> PRT
 <213> Bacteriophage Q-beta

<400> 20

Ala Lys Leu Glu Thr Val Thr Leu Gly Asn Ile Gly Arg Asp Gly Lys
 1 5 10 15

Gln Thr Leu Val Leu Asn Pro Arg Gly Val Asn Pro Thr Asn Gly Val
 20 25 30

Ala Ser Leu Ser Gln Ala Gly Ala Val Pro Ala Leu Glu Lys Arg Val
 35 40 45

Thr Val Ser Val Ser Gln Pro Ser Arg Asn Arg Lys Asn Tyr Lys Val
 50 55 60

Gln Val Lys Ile Gln Asn Pro Thr Ala Cys Thr Ala Asn Gly Ser Cys
 65 70 75 80

Asp Pro Ser Val Thr Arg Gln Lys Tyr Ala Asp Val Thr Phe Ser Phe
 85 90 95

Thr Gln Tyr Ser Thr Asp Glu Glu Arg Ala Phe Val Arg Thr Glu Leu
 100 105 110

Ala Ala Leu Leu Ala Ser Pro Leu Leu Ile Asp Ala Ile Asp Gln Leu

115 120 10 125
 Asn Pro Ala Tyr
 130

 <210> 21
 <211> 132
 <212> PRT
 <213> Bacteriophage Q-beta

 <400> 21
 Ala Lys Leu Glu Thr Val Thr Leu Gly Lys Ile Gly Lys Asp Gly Lys
 1 5 10 15

 Gln Thr Leu Val Leu Asn Pro Arg Gly Val Asn Pro Thr Asn Gly Val
 20 25 30

 Ala Ser Leu Ser Gln Ala Gly Ala Val Pro Ala Leu Glu Lys Arg Val
 35 40 45

 Thr Val Ser Val Ser Gln Pro Ser Arg Asn Arg Lys Asn Tyr Lys Val
 50 55 60

 Gln Val Lys Ile Gln Asn Pro Thr Ala Cys Thr Ala Asn Gly Ser Cys
 65 70 75 80

 Asp Pro Ser Val Thr Arg Gln Lys Tyr Ala Asp Val Thr Phe Ser Phe
 85 90 95

 Thr Gln Tyr Ser Thr Asp Glu Glu Arg Ala Phe Val Arg Thr Glu Leu
 100 105 110

 Ala Ala Leu Leu Ala Ser Pro Leu Leu Ile Asp Ala Ile Asp Gln Leu
 115 120 125

 Asn Pro Ala Tyr
 130

 <210> 22
 <211> 132
 <212> PRT
 <213> Bacteriophage Q-beta

 <400> 22
 Ala Arg Leu Glu Thr Val Thr Leu Gly Asn Ile Gly Arg Asp Gly Lys
 1 5 10 15

 Gln Thr Leu Val Leu Asn Pro Arg Gly Val Asn Pro Thr Asn Gly Val
 20 25 30

 Ala Ser Leu Ser Gln Ala Gly Ala Val Pro Ala Leu Glu Lys Arg Val
 35 40 45

 Thr Val Ser Val Ser Gln Pro Ser Arg Asn Arg Lys Asn Tyr Lys Val
 50 55 60

 Gln Val Lys Ile Gln Asn Pro Thr Ala Cys Thr Ala Asn Gly Ser Cys
 65 70 75 80

11

Asp Pro Ser Val Thr Arg Gln Lys Tyr Ala Asp Val Thr Phe Ser Phe
85 90 95

Thr Gln Tyr Ser Thr Asp Glu Glu Arg Ala Phe Val Arg Thr Glu Leu
100 105 110

Ala Ala Leu Leu Ala Ser Pro Leu Leu Ile Asp Ala Ile Asp Gln Leu
115 120 125

Asn Pro Ala Tyr
130

<210> 23
<211> 132
<212> PRT
<213> Bacteriophage Q-beta

<400> 23

Ala Lys Leu Glu Thr Val Thr Leu Gly Asn Ile Gly Lys Asp Gly Arg
1 5 10 15

Gln Thr Leu Val Leu Asn Pro Arg Gly Val Asn Pro Thr Asn Gly Val
20 25 30

Ala Ser Leu Ser Gln Ala Gly Ala Val Pro Ala Leu Glu Lys Arg Val
35 40 45

Thr Val Ser Val Ser Gln Pro Ser Arg Asn Arg Lys Asn Tyr Lys Val
50 55 60

Gln Val Lys Ile Gln Asn Pro Thr Ala Cys Thr Ala Asn Gly Ser Cys
65 70 75 80

Asp Pro Ser Val Thr Arg Gln Lys Tyr Ala Asp Val Thr Phe Ser Phe
85 90 95

Thr Gln Tyr Ser Thr Asp Glu Glu Arg Ala Phe Val Arg Thr Glu Leu
100 105 110

Ala Ala Leu Leu Ala Ser Pro Leu Leu Ile Asp Ala Ile Asp Gln Leu
115 120 125

Asn Pro Ala Tyr
130

<210> 24
<211> 132
<212> PRT
<213> Bacteriophage Q-beta

<400> 24

Ala Arg Leu Glu Thr Val Thr Leu Gly Asn Ile Gly Lys Asp Gly Arg
1 5 10 15

Gln Thr Leu Val Leu Asn Pro Arg Gly Val Asn Pro Thr Asn Gly Val
20 25 30

Ala Ser Leu Ser Gln Ala Gly Ala Val Pro Ala Leu Glu Lys Arg Val

35 40 12 45
 Thr Val Ser Val Ser Gln Pro Ser Arg Asn Arg Lys Asn Tyr Lys Val
 50 55 60
 Gln Val Lys Ile Gln Asn Pro Thr Ala Cys Thr Ala Asn Gly Ser Cys
 65 70 75 80
 Asp Pro Ser Val Thr Arg Gln Lys Tyr Ala Asp Val Thr Phe Ser Phe
 85 90 95
 Thr Gln Tyr Ser Thr Asp Glu Glu Arg Ala Phe Val Arg Thr Glu Leu
 100 105 110
 Ala Ala Leu Leu Ala Ser Pro Leu Leu Ile Asp Ala Ile Asp Gln Leu
 115 120 125
 Asn Pro Ala Tyr
 130

<210> 25
 <211> 184
 <212> PRT
 <213> Hepatitis B virus

<400> 25

Met Asp Ile Asp Pro Tyr Glu Phe Gly Ala Thr Val Glu Leu Leu Ser
 1 5 10 15
 Phe Leu Pro Ser Asp Phe Phe Pro Ser Val Arg Asp Leu Leu Asp Thr
 20 25 30
 Ala Ser Ala Leu Tyr Arg Glu Ala Leu Glu Ser Pro Glu His Cys Ser
 35 40 45
 Pro His His Thr Ala Leu Arg Gln Ala Ile Leu Cys Trp Gly Glu Leu
 50 55 60
 Met Thr Leu Ala Thr Trp Val Gly Asn Asn Leu Glu Asp Pro Ala Ser
 65 70 75 80
 Arg Asp Leu Val Val Asn Tyr Val Asn Thr Asn Met Gly Leu Lys Ile
 85 90 95
 Arg Gln Leu Leu Trp Phe His Ile Ser Cys Leu Thr Phe Gly Arg Glu
 100 105 110
 Thr Val Leu Glu Tyr Leu Val Ser Phe Gly Val Trp Ile Arg Thr Pro
 115 120 125
 Pro Ala Tyr Arg Pro Pro Asn Ala Pro Ile Leu Ser Thr Leu Pro Glu
 130 135 140
 Thr Thr Val Val Arg Arg Arg Asp Arg Gly Arg Ser Pro Arg Arg Arg
 145 150 155 160
 Thr Pro Ser Pro Arg Arg Arg Arg Ser Gln Ser Pro Arg Arg Arg Arg
 165 170 175

Ser Gln Ser Arg Glu Ser Gln Cys
180

<210> 26
<211> 213
<212> PRT
<213> Hepatitis B virus

<400> 26

Met Gln Leu Phe His Leu Cys Leu Ile Ile Ser Cys Ser Cys Pro Thr
1 5 10 15

Val Gln Ala Ser Lys Leu Cys Leu Gly Trp Leu Trp Gly Met Asp Ile
20 25 30

Asp Pro Tyr Lys Glu Phe Gly Ala Thr Val Glu Leu Leu Ser Phe Leu
35 40 45

Pro Ser Asp Phe Phe Pro Ser Val Arg Asp Leu Leu Asp Thr Ala Ser
50 55 60

Ala Leu Tyr Arg Glu Ala Leu Glu Ser Pro Glu His Cys Ser Pro His
65 70 75 80

His Thr Ala Leu Arg Gln Ala Ile Leu Cys Trp Gly Asp Leu Met Asn
85 90 95

Leu Ala Thr Trp Val Gly Gly Asn Leu Glu Asp Pro Val Ser Arg Asp
100 105 110

Leu Val Val Gly Tyr Val Asn Thr Thr Val Gly Leu Lys Phe Arg Gln
115 120 125

Leu Leu Trp Phe His Ile Ser Cys Leu Thr Phe Gly Arg Glu Thr Val
130 135 140

Ile Glu Tyr Leu Val Ser Phe Gly Val Trp Ile Arg Thr Pro Pro Ala
145 150 155 160

Tyr Arg Pro Pro Asn Ala Pro Ile Leu Ser Thr Leu Pro Glu Thr Thr
165 170 175

Val Val Arg Arg Arg Gly Arg Ser Pro Arg Arg Arg Thr Pro Ser Pro
180 185 190

Pro Arg Arg Arg Arg Ser Gln Ser Pro Arg Arg Arg Arg Ser Gln Ser
195 200 205

Arg Glu Ser Gln Cys
210

<210> 27
<211> 188
<212> PRT
<213> Hepatitis B virus

<400> 27

Met Asp Ile Asp Pro Tyr Lys Glu Phe Gly¹⁴ Ser Ser Tyr Gln Leu Leu
 1 5 10 15
 Asn Phe Leu Pro Leu Asp Phe Phe Pro Asp Leu Asn Ala Leu Val Asp
 20 25 30
 Thr Ala Thr Ala Leu Tyr Glu Glu Glu Leu Thr Gly Arg Glu His Cys
 35 40 45
 Ser Pro His His Thr Ala Ile Arg Gln Ala Leu Val Cys Trp Asp Glu
 50 55 60
 Leu Thr Lys Leu Ile Ala Trp Met Ser Ser Asn Ile Thr Ser Glu Gln
 65 70 75 80
 Val Arg Thr Ile Ile Val Asn His Val Asn Asp Thr Trp Gly Leu Lys
 85 90 95
 Val Arg Gln Ser Leu Trp Phe His Leu Ser Cys Leu Thr Phe Gly Gln
 100 105 110
 His Thr Val Gln Glu Phe Leu Val Ser Phe Gly Val Trp Ile Arg Thr
 115 120 125
 Pro Ala Pro Tyr Arg Pro Pro Asn Ala Pro Ile Leu Ser Thr Leu Pro
 130 135 140
 Glu His Thr Val Ile Arg Arg Arg Gly Gly Ala Arg Ala Ser Arg Ser
 145 150 155 160
 Pro Arg Arg Arg Thr Pro Ser Pro Arg Arg Arg Arg Ser Gln Ser Pro
 165 170 175
 Arg Arg Arg Arg Ser Gln Ser Pro Ser Thr Asn Cys
 180 185

<210> 28
 <211> 185
 <212> PRT
 <213> Hepatitis B virus

<400> 28

Met Asp Ile Asp Pro Tyr Lys Glu Phe Gly Ala Thr Val Glu Leu Leu
 1 5 10 15
 Ser Phe Leu Pro Ser Asp Phe Phe Pro Ser Val Arg Asp Leu Leu Asp
 20 25 30
 Thr Ala Ser Ala Leu Tyr Arg Glu Ala Leu Glu Ser Pro Glu His Cys
 35 40 45
 Ser Pro His His Thr Ala Leu Arg Gln Ala Ile Leu Cys Trp Gly Glu
 50 55 60
 Leu Met Thr Leu Ala Thr Trp Val Gly Asn Asn Leu Glu Asp Pro Ala
 65 70 75 80
 Ser Arg Asp Leu Val Val Asn Tyr Val Asn Thr Asn Met Gly Leu Lys

85 90 15 95
 Ile Arg Gln Leu Leu Trp Phe His Ile Ser Cys Leu Thr Phe Gly Arg
 100 105 110
 Glu Thr Val Leu Glu Tyr Leu Val Ser Phe Gly Val Trp Ile Arg Thr
 115 120 125
 Pro Pro Ala Tyr Arg Pro Pro Asn Ala Pro Ile Leu Ser Thr Leu Pro
 130 135 140
 Glu Thr Thr Val Val Arg Arg Arg Asp Arg Gly Arg Ser Pro Arg Arg
 145 150 155 160
 Arg Thr Pro Ser Pro Arg Arg Arg Arg Ser Gln Ser Pro Arg Arg Arg
 165 170 175
 Arg Ser Gln Ser Arg Glu Ser Gln Cys
 180 185

<210> 29
 <211> 152
 <212> PRT
 <213> Hepatitis B virus

<400> 29

Met Asp Ile Asp Pro Tyr Lys Glu Phe Gly Ala Thr Val Glu Leu Leu
 1 5 10 15
 Ser Phe Leu Pro Ser Asp Phe Phe Pro Ser Val Arg Asp Leu Leu Asp
 20 25 30
 Thr Ala Ala Ala Leu Tyr Arg Asp Ala Leu Glu Ser Pro Glu His Cys
 35 40 45
 Ser Pro His His Thr Ala Leu Arg Gln Ala Ile Leu Cys Trp Gly Asp
 50 55 60
 Leu Met Thr Leu Ala Thr Trp Val Gly Thr Asn Leu Glu Asp Gly Gly
 65 70 75 80
 Lys Gly Gly Ser Arg Asp Leu Val Val Ser Tyr Val Asn Thr Asn Val
 85 90 95
 Gly Leu Lys Phe Arg Gln Leu Leu Trp Phe His Ile Ser Cys Leu Thr
 100 105 110
 Phe Gly Arg Glu Thr Val Leu Glu Tyr Leu Val Ser Phe Gly Val Trp
 115 120 125
 Ile Arg Thr Pro Pro Ala Tyr Arg Pro Pro Asn Ala Pro Ile Leu Ser
 130 135 140
 Thr Leu Pro Glu Thr Thr Val Val
 145 150

<210> 30
 <211> 3635

<212> DNA
 <213> Artificial sequence

<220>
 <223> plasmid pAP283-58

<400> 30
 cgagctcgcc cctggcttat cgaaattaat acgactcact atagggagac cggaattcga 60
 gctcgcccgg ggatcctcta gaattttctg cgcacccatc ccgggtggcg cccaaagtga 120
 ggaaaatcac atggcaaata agccaatgca accgatcaca tctacagcaa ataaaattgt 180
 gtggtcggat ccaactcgtt tatcaactac attttcagca agtctgttac gccaacgtgt 240
 taaagttggg atagccgaac tgaataatgt ttcagggtcaa tatgtatctg ttataagcg 300
 tcctgcacct aaaccggaag gttgtgcaga tgcctgtgtc attatgccga atgaaaacca 360
 atccattcgc acagtgatgt cagggtcagc cgaaaacttg gctaccttaa aagcagaatg 420
 ggaaactcac aaacgtaacg ttgacacact cttcgcgagc ggcaacgccg gtttgggttt 480
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 gtgtcaccta aatcgatatg gtatgataca taaggttatg tattaattgt agccgcgttc 600
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17

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20 25 30

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35 40 45

Gly Gln Tyr Val Ser Val Tyr Lys Arg Pro Ala¹⁸ Pro Lys Pro Glu Gly
 50 55 60
 Cys Ala Asp Ala Cys Val Ile Met Pro Asn Glu Asn Gln Ser Ile Arg
 65 70 75 80
 Thr Val Ile Ser Gly Ser Ala Glu Asn Leu Ala Thr Leu Lys Ala Glu
 85 90 95
 Trp Glu Thr His Lys Arg Asn Val Asp Thr Leu Phe Ala Ser Gly Asn
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<210> 32
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 <223> AP205 coat protein

<400> 32

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 20 25 30
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 35 40 45
 Gly Gln Tyr Val Ser Val Tyr Lys Arg Pro Ala Pro Lys Pro Glu Gly
 50 55 60
 Cys Ala Asp Ala Cys Val Ile Met Pro Asn Glu Asn Gln Ser Ile Arg
 65 70 75 80
 Thr Val Ile Ser Gly Ser Ala Glu Asn Leu Ala Thr Leu Lys Ala Glu
 85 90 95
 Trp Glu Thr His Lys Arg Asn Val Asp Thr Leu Phe Ala Ser Gly Asn
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 Ala Gly Leu Gly Phe Leu Asp Pro Thr Ala Ala Ile Val Ser Ser Asp
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<223> plasmid pAP281-32

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20

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Glu Leu Ala Gly Ile Gly Ile Leu Thr Val
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<400> 36

Gly His Gly His Ser Tyr Thr Thr Ala Glu Glu Leu Ala Gly Ile Gly
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Ile Leu Thr Val
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<210> 37
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<210> 39
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Gly Ile Leu Thr Val
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<400> 40

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Gly Ile Leu Thr Val
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<223> MelanA 26-35

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<223> MelanA 26-40 A/L

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Val Leu

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 <223> Glycine can be repeated from zero to five times

<220>
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 <222> (3)..(3)
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<220>
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24

<222> (2)..(2)
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 <221> REPEAT
 <222> (3)..(7)
 <223> These residues can be repeated from zero to three times as a group

 <220>
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 <220>
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 <222> (10)..(10)
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 <210> 49
 <211> 5
 <212> PRT
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 <220>
 <223> Glycine serine linker

 <400> 49
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 1 5

 <210> 50
 <211> 10
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 <220>
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 Cys Gly Asp Lys Thr His Thr Ser Pro Pro
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 <210> 51
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 <220>
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 Asp Lys Thr His Thr Ser Pro Pro Cys Gly
 1 5 10

 <210> 52
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 <400> 52

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<210> 53
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 <212> PRT
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<220>
 <223> C-terminal gamma 3

<400> 53

Pro Lys Pro Ser Thr Pro Pro Gly Ser Ser Gly Gly Ala Pro Gly Gly
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Cys Gly

<210> 54
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<220>
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<400> 54

Gly Cys Gly Gly Gly Gly
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<210> 55
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Gly Gly Gly Gly Cys Gly
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<210> 56
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<400> 56

Gly Gly Lys Lys Gly Cys
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<210> 57
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<220>
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<400> 57

Cys Gly Lys Lys Gly Gly
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<211> 6

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<211> 6

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<223> N-terminal linker 2

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<210> 60

<211> 6

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<220>

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Gly Gly Lys Lys Gly Cys
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Gly Gly Glu Asp Gly Cys
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<400> 62

Gly Gly Cys Gly
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<400> 63

Lys Thr Trp Gly Gln Tyr Trp Gln Val
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Ile Thr Asp Gln Val Pro Phe Ser Val
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Leu Leu Asp Gly Thr Ala Thr Leu Arg Leu
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Val Leu Tyr Arg Tyr Gly Ser Phe Ser Val
1 5 10

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Glu Ala Ala Gly Ile Gly Ile Leu Thr Val
1 5 10

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Ala Ala Gly Ile Gly Ile Leu Thr Val
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Ile Leu Thr Val Ile Leu Gly Val Leu
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Met Leu Leu Ala Val Leu Tyr Cys Leu
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Tyr Met Asp Gly Thr Met Ser Gln Val
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Lys Ile Phe Gly Ser Leu Ala Phe Leu
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<210> 81
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<400> 81

Thr Leu Gly Ile Val Cys Pro Ile
1 5

<210> 82
<211> 9
<212> PRT
<213> Homo sapiens

<400> 82

Lys Ala Val Tyr Asn Phe Ala Thr Met
1 5

<210> 83
<211> 12
<212> PRT
<213> Homo sapiens

<400> 83

Cys Gly Gly Lys Ala Val Tyr Asn Phe Ala Thr Met
 1 5 10 30

<210> 84
 <211> 12
 <212> PRT
 <213> Homo sapiens

<400> 84

Lys Ala Val Tyr Asn Phe Ala Thr Met Gly Gly Cys
 1 5 10

<210> 85
 <211> 18
 <212> PRT
 <213> Homo sapiens

<400> 85

Cys Gly Gly Gly Ser Glu Glu Ile Arg Ser Leu Tyr Asn Thr Val Ala
 1 5 10 15

Thr Leu

<210> 86
 <211> 50
 <212> PRT
 <213> Artificial Sequence

<220>
 <223> HIV Gag-G50

<400> 86

Cys Gln Gly Gln Met Val His Gln Ala Ile Ser Pro Arg Thr Leu Asn
 1 5 10 15

Ala Trp Val Lys Ala Phe Ser Pro Glu Val Ile Pro Met Phe Ser Ala
 20 25 30

Leu Ser Glu Gly Ala Thr Pro Gln Asp Leu Asn Thr Met Leu Asn Thr
 35 40 45

Val Lys
 50

<210> 87
 <211> 56
 <212> PRT
 <213> Artificial Sequence

<220>
 <223> HIV Nef-N56

<400> 87

Cys Gly Val Gly Phe Pro Val Arg Pro Gln Val Pro Leu Arg Pro Met
 1 5 10 15

Thr Tyr Lys Ala Ala Val Asp Leu Ser His Phe Leu Lys Glu Lys Gly
 20 25 30

Gly Leu Glu Gly Pro Gly Ile Arg Tyr Pro Leu Thr Phe Gly Trp Cys
 35 40 45

31

Phe Lys Leu Val Pro Val Glu Pro
50 55

<210> 88
<211> 69
<212> PRT
<213> Artificial Sequence

<220>
<223> Gag-G68n

<400> 88

Cys Gly Glu Ile Tyr Lys Arg Trp Ile Ile Leu Gly Leu Asn Lys Ile
1 5 10 15

Val Arg Met Tyr Gln Gly Gln Met Val His Gln Ala Ile Ser Pro Arg
20 25 30

Thr Leu Asn Ala Trp Val Lys Ala Phe Ser Pro Glu Val Ile Pro Met
35 40 45

Phe Ser Ala Leu Ser Glu Gly Ala Thr Pro Gln Asp Leu Asn Thr Met
50 55 60

Leu Asn Thr Val Lys
65

<210> 89
<211> 9
<212> PRT
<213> Homo sapiens

<400> 89

Leu Ala Gly Ile Gly Ile Leu Thr Val
1 5

<210> 90
<211> 9
<212> PRT
<213> Homo sapiens

<400> 90

Met Ala Gly Ile Gly Ile Leu Thr Val
1 5

<210> 91
<211> 10
<212> PRT
<213> Homo sapiens

<400> 91

Glu Ala Met Gly Ile Gly Ile Leu Thr Val
1 5 10

<210> 92
<211> 10
<212> PRT
<213> Homo sapiens

<400> 92

Glu Met Ala Gly Ile Gly Ile Leu Thr Val 32
 1 5 10

<210> 93
 <211> 10
 <212> PRT
 <213> Homo sapiens

<400> 93

Tyr Ala Ala Gly Ile Gly Ile Leu Thr Val
 1 5 10

<210> 94
 <211> 10
 <212> PRT
 <213> Homo sapiens

<400> 94

Phe Ala Ala Gly Ile Gly Ile Leu Thr Val
 1 5 10

<210> 95
 <211> 9
 <212> PRT
 <213> Homo sapiens

<400> 95

Leu Pro Tyr Leu Gly Trp Leu Val Phe
 1 5

<210> 96
 <211> 206
 <212> PRT
 <213> Human immunodeficiency virus

<400> 96

Met Gly Gly Lys Trp Ser Lys Arg Ser Val Val Gly Trp Pro Thr Val
 1 5 10 15

Arg Glu Arg Met Arg Arg Ala Glu Pro Ala Ala Asp Gly Val Gly Ala
 20 25 30

Val Ser Arg Asp Leu Glu Lys His Gly Ala Ile Thr Ser Ser Asn Thr
 35 40 45

Ala Ala Asn Asn Ala Asp Cys Ala Trp Leu Glu Ala Gln Glu Glu Glu
 50 55 60

Glu Val Gly Phe Pro Val Arg Pro Gln Val Pro Leu Arg Pro Met Thr
 65 70 75 80

Tyr Lys Ala Ala Val Asp Leu Ser His Phe Leu Lys Glu Lys Gly Gly
 85 90 95

Leu Glu Gly Leu Ile Tyr Ser Gln Lys Arg Gln Asp Ile Leu Asp Leu
 100 105 110

Trp Val Tyr His Thr Gln Gly Tyr Phe Pro Asp Trp Gln Asn Tyr Thr
 115 120 125

Pro Gly Pro Gly Ile Arg Tyr Pro Leu Thr Phe³³ Gly Trp Cys Phe Lys
 130 135 140

Leu Val Pro Val Glu Pro Glu Lys Val Glu Glu Ala Asn Glu Gly Glu
 145 150 155 160

Asn Asn Ser Leu Leu His Pro Met Ser Leu His Gly Met Asp Asp Pro
 165 170 175

Glu Arg Glu Val Leu Val Trp Lys Phe Asp Ser Arg Leu Ala Phe His
 180 185 190

His Met Ala Arg Glu Leu His Pro Glu Tyr Tyr Lys Asp Cys
 195 200 205

<210> 97
 <211> 500
 <212> PRT
 <213> Human immunodeficiency virus

<400> 97

Met Gly Ala Arg Ala Ser Val Leu Ser Gly Gly Glu Leu Asp Arg Trp
 1 5 10 15

Glu Lys Ile Arg Leu Arg Pro Gly Gly Lys Lys Lys Tyr Lys Leu Lys
 20 25 30

His Ile Val Trp Ala Ser Arg Glu Leu Glu Arg Phe Ala Val Asn Pro
 35 40 45

Gly Leu Leu Glu Thr Ser Glu Gly Cys Arg Gln Ile Leu Gly Gln Leu
 50 55 60

Gln Pro Ser Leu Gln Thr Gly Ser Glu Glu Leu Arg Ser Leu Tyr Asn
 65 70 75 80

Thr Val Ala Thr Leu Tyr Cys Val His Gln Lys Ile Glu Val Lys Asp
 85 90 95

Thr Lys Glu Ala Leu Asp Lys Ile Glu Glu Glu Gln Asn Lys Ser Lys
 100 105 110

Lys Lys Ala Gln Gln Ala Ala Ala Asp Thr Gly Asn Ser Ser Gln Val
 115 120 125

Ser Gln Asn Tyr Pro Ile Val Gln Asn Leu Gln Gly Gln Met Val His
 130 135 140

Gln Ala Ile Ser Pro Arg Thr Leu Asn Ala Trp Val Lys Val Val Glu
 145 150 155 160

Glu Lys Ala Phe Ser Pro Glu Val Ile Pro Met Phe Ser Ala Leu Ser
 165 170 175

Glu Gly Ala Thr Pro Gln Asp Leu Asn Thr Met Leu Asn Thr Val Gly
 180 185 190

Gly His Gln Ala Ala Met Gln Met Leu Lys Glu Thr Ile Asn Glu Glu

195 200 34 205
 Ala Ala Glu Trp Asp Arg Leu His Pro Val His Ala Gly Pro Ile Ala
 210 215 220
 Pro Gly Gln Met Arg Glu Pro Arg Gly Ser Asp Ile Ala Gly Thr Thr
 225 230 235 240
 Ser Thr Leu Gln Glu Gln Ile Gly Trp Met Thr Asn Asn Pro Pro Ile
 245 250 255
 Pro Val Gly Glu Ile Tyr Lys Arg Trp Ile Ile Leu Gly Leu Asn Lys
 260 265 270
 Ile Val Arg Met Tyr Ser Pro Thr Ser Ile Leu Asp Ile Arg Gln Gly
 275 280 285
 Pro Lys Glu Pro Phe Arg Asp Tyr Val Asp Arg Phe Tyr Lys Thr Leu
 290 295 300
 Arg Ala Glu Gln Ala Ser Gln Glu Val Lys Asn Trp Met Thr Glu Thr
 305 310 315 320
 Leu Leu Val Gln Asn Ala Asn Pro Asp Cys Lys Thr Ile Leu Lys Ala
 325 330 335
 Leu Gly Pro Ala Ala Thr Leu Glu Glu Met Met Thr Ala Cys Gln Gly
 340 345 350
 Val Gly Gly Pro Gly His Lys Ala Arg Val Leu Ala Glu Ala Met Ser
 355 360 365
 Gln Val Thr Asn Ser Ala Thr Ile Met Met Gln Arg Gly Asn Phe Arg
 370 375 380
 Asn Gln Arg Lys Thr Val Lys Cys Phe Asn Cys Gly Lys Glu Gly His
 385 390 395 400
 Ile Ala Lys Asn Cys Arg Ala Pro Arg Lys Lys Gly Cys Trp Lys Cys
 405 410 415
 Gly Lys Glu Gly His Gln Met Lys Asp Cys Thr Glu Arg Gln Ala Asn
 420 425 430
 Phe Leu Gly Lys Ile Trp Pro Ser His Lys Gly Arg Pro Gly Asn Phe
 435 440 445
 Leu Gln Ser Arg Pro Glu Pro Thr Ala Pro Pro Glu Glu Ser Phe Arg
 450 455 460
 Phe Gly Glu Glu Thr Thr Thr Pro Ser Gln Lys Gln Glu Pro Ile Asp
 465 470 475 480
 Lys Glu Leu Tyr Pro Leu Ala Ser Leu Arg Ser Leu Phe Gly Asn Asp
 485 490 495
 Pro Ser Ser Gln

500

35

<210> 98
 <211> 34
 <212> PRT
 <213> Human immunodeficiency virus

<400> 98

Val Gly Phe Pro Val Arg Pro Gln Val Pro Leu Arg Pro Met Thr Tyr
 1 5 10 15

Lys Ala Ala Val Asp Leu Ser His Phe Leu Lys Glu Lys Gly Gly Leu
 20 25 30

Glu Gly

<210> 99
 <211> 20
 <212> PRT
 <213> Human immunodeficiency virus

<400> 99

Pro Gly Ile Arg Tyr Pro Leu Thr Phe Gly Trp Cys Phe Lys Leu Val
 1 5 10 15

Pro Val Glu Pro
 20

<210> 100
 <211> 5
 <212> PRT
 <213> Human immunodeficiency virus

<400> 100

Lys Val Val Glu Glu
 1 5

<210> 101
 <211> 18
 <212> PRT
 <213> Human immunodeficiency virus

<400> 101

Gln Gly Gln Met Val His Gln Ala Ile Ser Pro Arg Thr Leu Asn Ala
 1 5 10 15

Trp Val

<210> 102
 <211> 30
 <212> PRT
 <213> Human immunodeficiency virus

<400> 102

Lys Ala Phe Ser Pro Glu Val Ile Pro Met Phe Ser Ala Leu Ser Glu
 1 5 10 15

Gly Ala Thr Pro Gln Asp Leu Asn Thr Met Leu Asn Thr Val
 20 25 30

<210> 103
 <211> 19
 <212> PRT
 <213> Human immunodeficiency virus

<400> 103

Gly Glu Ile Tyr Lys Arg Trp Ile Ile Leu Gly Leu Asn Lys Ile Val
 1 5 10 15

Arg Met Tyr

<210> 104
 <211> 54
 <212> PRT
 <213> Human immunodeficiency virus

<400> 104

Val Gly Phe Pro Val Arg Pro Gln Val Pro Leu Arg Pro Met Thr Tyr
 1 5 10 15

Lys Ala Ala Val Asp Leu Ser His Phe Leu Lys Glu Lys Gly Gly Leu
 20 25 30

Glu Gly Pro Gly Ile Arg Tyr Pro Leu Thr Phe Gly Trp Cys Phe Lys
 35 40 45

Leu Val Pro Val Glu Pro
 50

<210> 105
 <211> 48
 <212> PRT
 <213> Human immunodeficiency virus

<400> 105

Gln Gly Gln Met Val His Gln Ala Ile Ser Pro Arg Thr Leu Asn Ala
 1 5 10 15

Trp Val Lys Ala Phe Ser Pro Glu Val Ile Pro Met Phe Ser Ala Leu
 20 25 30

Ser Glu Gly Ala Thr Pro Gln Asp Leu Asn Thr Met Leu Asn Thr Val
 35 40 45

<210> 106
 <211> 49
 <212> PRT
 <213> Artificial Sequence

<220>
 <223> HIV C_Gag-G50

<400> 106

Cys Gln Gly Gln Met Val His Gln Ala Ile Ser Pro Arg Thr Leu Asn
 1 5 10 15

Ala Trp Val Lys Ala Phe Ser Pro Glu Val Ile Pro Met Phe Ser Ala
 20 25 30

37

Leu Ser Glu Gly Ala Thr Pro Gln Asp Leu Asn Thr Met Leu Asn Thr
 35 40 45

Val

<210> 107
 <211> 67
 <212> PRT
 <213> Human immunodeficiency virus

<400> 107

Gly Glu Ile Tyr Lys Arg Trp Ile Ile Leu Gly Leu Asn Lys Ile Val
 1 5 10 15

Arg Met Tyr Gln Gly Gln Met Val His Gln Ala Ile Ser Pro Arg Thr
 20 25 30

Leu Asn Ala Trp Val Lys Ala Phe Ser Pro Glu Val Ile Pro Met Phe
 35 40 45

Ser Ala Leu Ser Glu Gly Ala Thr Pro Gln Asp Leu Asn Thr Met Leu
 50 55 60

Asn Thr Val
 65

<210> 108
 <211> 68
 <212> PRT
 <213> Artificial Sequence

<220>
 <223> HIV C_{gag}-G68n

<400> 108

Cys Gly Glu Ile Tyr Lys Arg Trp Ile Ile Leu Gly Leu Asn Lys Ile
 1 5 10 15

Val Arg Met Tyr Gln Gly Gln Met Val His Gln Ala Ile Ser Pro Arg
 20 25 30

Thr Leu Asn Ala Trp Val Lys Ala Phe Ser Pro Glu Val Ile Pro Met
 35 40 45

Phe Ser Ala Leu Ser Glu Gly Ala Thr Pro Gln Asp Leu Asn Thr Met
 50 55 60

Leu Asn Thr Val
 65

<210> 109
 <211> 118
 <212> PRT
 <213> homo sapiens

<400> 109

Met Pro Arg Glu Asp Ala His Phe Ile Tyr Gly Tyr Pro Lys Lys Gly
 1 5 10 15

38

His Gly His Ser Tyr Thr Thr Ala Glu Glu Ala Ala Gly Ile Gly Ile
 20 25 30

Leu Thr Val Ile Leu Gly Val Leu Leu Leu Ile Gly Cys Trp Tyr Cys
 35 40 45

Arg Arg Arg Asn Gly Tyr Arg Ala Leu Met Asp Lys Ser Leu His Val
 50 55 60

Gly Thr Gln Cys Ala Leu Thr Arg Arg Cys Pro Gln Glu Gly Phe Asp
 65 70 75 80

His Arg Asp Ser Lys Val Ser Leu Gln Glu Lys Asn Cys Glu Pro Val
 85 90 95

Val Pro Asn Ala Pro Pro Ala Tyr Glu Lys Leu Ser Ala Glu Gln Ser
 100 105 110

Pro Pro Pro Tyr Ser Pro
 115

<210> 110
 <211> 16
 <212> PRT
 <213> Artificial Sequence

<220>
 <223> CSPKSL-Melana 26-35 A/L

<400> 110

Cys Ser Pro Lys Ser Leu Glu Leu Ala Gly Ile Gly Ile Leu Thr Val
 1 5 10 15

<210> 111
 <211> 18
 <212> PRT
 <213> Artificial Sequence

<220>
 <223> Melana 26-40-C A/L

<400> 111

Glu Leu Ala Gly Ile Gly Ile Leu Thr Val Ile Leu Gly Val Leu Gly
 1 5 10 15

Gly Cys